CONFERENCE ON DISARMAMENT

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PROGRESS REPORT TO THE CONFERENCE ON DISARMAMENT
ON THE THIRTY-NINTH SESSION OF THE AD HOC GROUP OF
SCIENTIFIC EXPERTS TO CONSIDER INTERNATIONAL COOPERATIVE
MEASURES TO DETECT AND IDENTIFY SEISMIC EVENTS

1. The Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events, initially established in pursuance of the decision taken by the Conference of the Committee on Disarmament on 22 July 1976, held its thirty-ninth formal session from 8 to 19 August 1994, in the Palais des Nations, Geneva, under the Chairmanship of Dr. Ola Dahlman of Sweden. This was the thirty-first session of the Group, convened under its new mandate by the decision of the Committee on Disarmament at its 48th meeting on 7 August 1979.

2. The Ad Hoc Group is open to all member States of the Conference on Disarmament. It is also open on a standing basis to all non-member States which have been invited upon their request by the Conference on Disarmament to participate in its work. Accordingly, scientific experts and representatives of the following member States of the Conference on Disarmament participated in the session: Argentina, Australia, Belgium, Bulgaria, Canada, China, Egypt, France, Germany, Hungary, India, Iran (Islamic Republic of), Italy, Japan, Netherlands, Pakistan, Peru, Poland, Russian Federation, Sweden, United Kingdom of Great Britain and Northern Ireland and the United States of America.

3. Scientific experts and representatives from the following non-member States of the Conference on Disarmament participated in the session: Austria, Czech Republic, Denmark, Finland, Israel, Republic of Korea, New Zealand, Norway, South Africa, Spain and Switzerland.

4. During the session 39 papers containing information on national investigations related to the work of the Group were presented by experts from: Argentina, Australia, Austria, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Finland, France, Germany, Hungary, India, Italy, Japan, New Zealand, Norway, Peru, Russian Federation, South Africa, Spain, Sweden, Switzerland, United Kingdom and United States of America.

5. The session was devoted to continuing the preparations for the upcoming full scale phase of the Ad Hoc Group's third Technical Test (GSETT-3), which is an effort to develop, test and evaluate new concepts for an experimental International Seismic Monitoring System. A report summarizing the knowledge and experience on GSETT-3, including the overall concept of GSETT-3, the functions and components of the system and matters of organization and cost has previously been presented to the Ad Hoc Committee on a Nuclear Test Ban and is provided to the Conference on Disarmament as document CD/1254.

6. The current plans call for the full-scale phase of IDC operation during GSETT-3 to begin by 1 January 1995. The Group reviewed its schedule to meet this date presented in CD/1245 and noted that the work is

progressing. Particularly noteworthy is the rapid progress in developing and conducting operations at the IDC. Plans for conducting and evaluating GSETT-3 have been developed in considerable detail. The remaining tasks are as follows (note that the various versions of the experimental International Data Center (IDC) are explained in CD/1245)

August-October 1994:	Continue step-by-step implementation of stations, communications network and national facilities
	Operate IDC Version 2a
October 1994:	IDC Version 2b implemented
October-December 1994:	Coordinate participation of countries and stations
	Coordinate elements of the experimental system
	Conduct quality assurance evaluation of the IDC
1 January 1995:	IDC Version 3 implemented
	Begin full-scale tests
	Begin evaluation of performance

7. The Ad Hoc Group recognizes that not all of the seismological stations envisaged for participation in GSETT-3 will be ready to provide data to the IDC by 1 January 1995. Nevertheless, the Group considers that the number of stations already committed, or expected to be committed during the remainder of 1994, will permit full-scale testing by that date.

8. Although it is recognized that the commitments required from participating States will involve allocation of considerable resources, it is difficult to give any precise indication of the duration of the GSETT-3 experiment. For financial planning purposes, countries participating in GSETT-3 should be prepared to support their national facilities and their communication links for a minimum of 1 year after the start of the full scale experiment.

It is of particular importance to ensure financial resources for continuous data transmission, and for operation of other facilities during GSETT-3. Countries are encouraged to assist by providing technical and financial assistance in these areas to other countries whose participation is essential.

9. A summary of the current status of participation of countries with seismological stations or with gamma data for GSETT-3 is given in Annex I. This Annex also lists countries from which commitments are still lacking for either Alpha or Beta stations.

10. The Ad Hoc Group has now defined an Alpha station network of 58 stations in 34 countries out of which 38 stations in 17 countries are currently committed for participation in GSETT-3. Efforts are now concentrating on obtaining commitments for the remaining stations. The number of Alpha stations contributing data to the IDC has increased from 6 (in February) to 12 today and is expected to further increase to around 23 by the end of August.

11. The Ad Hoc Group has received information from 29 countries on plans for a total of 93 Beta stations, out of which 76 stations in 22 countries are already committed for participation in GSETT-3. To ensure adequate global coverage of the Beta station network, the Chairman of the Ad Hoc Group has approached 21 countries - mostly countries not represented in the Ad Hoc Group - asking for consent to use data from stations already in existence in these countries, for the purposes of GSETT-3. The number of Beta stations contributing data to the IDC has increased from 13 in February to 21 today.

12. The Ad Hoc Group conducted in-depth discussions of the results of the three working groups that it has established to deal with the planning, operation and evaluation of GSETT-3. Several meetings of these working groups were held during the session. Summaries of the status of the efforts of these three working groups are annexed to this progress report.

13. A complete draft version of the overall GSETT-3 documentation, including the plan for GSETT-3 operational manuals factual description of facilities to be used, an evaluation plan and a number of technical annexes, was prepared. This voluminous documentation (more than 500 pages) forms the basis for operations manuals and procedures for GSETT-3. It will also contain technical summaries of IDC and station operations and ongoing evaluation results during GSETT-3. Previous experience has shown that documentation of this type is essential. The documentation will be revised along the way, with a complete updated set distributed before 1 January 1995, and with the most current version at any time being electronically available on-line for the participants during GSETT-3.

14. In accordance with the schedule given in CD/1245, operation of Version 1 of the GSETT-3 IDC concluded on 30 June 1994. Subsequently, operation of Version 2A, which includes new participants, stations, software, hardware and processing objectives, began. International staffing of the IDC is an important objective of the Working Group on Operations. During the session applications for positions at the IDC were reviewed and qualified applicants were selected. Offers will be extended to the successful applicants.

15. The Working Group on Evaluation has concluded that much of the information required to evaluate GSETT-3 could be provided by the IDC. However, many of the tasks outlined in the evaluation volume of the GSETT-3 documentation can only be carried out at NDCs or through national investigations. The Working Group, seeking to obtain wider participation in these efforts, distributed a questionnaire during the session, asking national delegations to contribute. Positive responses from 25 countries were received. The Working Group also reached agreement on the evaluation volume of the documentation and on the evaluation format.

16. The Ad Hoc Group received and appreciated a briefing from the Chairman of the Nuclear Test Ban Committee's Working Group on Verification.

17. The Ad Hoc Group noted with appreciation the convening of an informal technical workshop on preparations for GSETT-3 in Alexandria, Virginia, USA from 25 through 29 April 1994. The workshop was attended by 28 participants from 12 countries. The Working Group on Evaluation met during the workshop, and also visited the IDC. Draft material compiled by those who participated in this workshop contributed significantly to the concepts and procedures embodied in the GSETT-3 documentation being prepared by the GSETT-3 Working Groups.

18. The Ad Hoc Group received a letter from the International Seismological Centre (ISC) proposing cooperation between the Group and ISC. Specifically, the ISC requests to receive the GSETT-3 bulletin and seismic phase data on a regular basis. The Ad Hoc Group agreed in principle to

provide these data to the scientific community in a suitable manner and at a suitable time. The Group appreciated the offer of Ms. Hilary Trodd of the UK to act as a contact person with the ISC.

19. The Ad Hoc Group suggests that its next session, subject to approval by the Conference on Disarmament, should be convened from 20 February to 3 March 1995. The main task during this session will be to review and evaluate initial results from the full-scale phase of GSETT-3. A draft work program is presented in Annex V.

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Annex I: Status of GSETT3 Station and Gamma Data Committments

Country	Alpha Stations Envisaged by GSE	Beta Stations Offered	Station Committment Status	Date Available to the IDC	Gamma Data Committed
Argentina	1	-	committed	Dec. 1994	yes
Australia	5	11	committed	Aug./Sept.1994	yes
Austria	0	1	lacking	unknown	-
Belgium	0	0	not applicable	not applicable	yes
Bolivia	1	-	lacking	unknown	-
Botswana	1	-	lacking	unknown	-
Brazil	1	0	committed	unknown	-
Bulgaria	0	1	committed	July 1995	yes
Canada	6	18	committed	Now/Sept. 1994	yes
Cen. Afr. Republic	1	-	committed	unknown	-
China	3	1	lacking	unknown	-
Cook Islands	0	1	committed	now	-
Czech Republic	0	1	committed	Sept. 1994	yes
Denmark	1	0	lacking	July 1995	yes
Egypt	1	0	lacking	unknown	-
Finland	1	4	committed	now/Nov. 1994	yes
France	1	0	committed	Jan. 1995	yes
Germany	1	9	lacking	unknown	-
Hungary	0	1	committed	now	yes
India	1	0	committed	unknown	-
Indonesia	1	-	lacking	unknown	-
Iran	0	1	lacking	June 1995	yes
Israel	0	1	lacking	Nov. 1994	-
Italy	0	2	committed	now	yes
Ivory Coast	1	-	lacking	unknown	-
Japan	1	7	committed	Sept. 1994	yes
Kazakhstan	1	-	lacking	unknown	-
Kenya	1	-	lacking	unknown	-
Rep. of Korea	1	-	lacking	unknown	-
Mexico	1	2	lacking	unknown	-
Netherlands	0	1	committed	Aug. 1994	yes
N. Africa (XAF)	1	-	lacking	unknown	-
New Zealand	0	1	committed	now	yes
Norway	3	1	committed	now/Oct. 1994	yes
Pakistan	1	1	committed	expect Jan.1995	-
Papua New Guinea	1	-	lacking	unknown	-
Paraguay	1	-	lacking	unknown	-
Peru	0	1	committed	Dec. 1994	-
Poland	0	1	lacking	unknown	yes
Romania	0	1	committed	Sept. 1994	yes
Russian Federation	5	5	committed	Jan. 1995	-
S. America (XSA)	1	-	lacking	unknown	-
South Africa	1	1	committed	Aug./ Dec. 1994	yes
Spain	1	2	committed	Jan. 1995	yes
Sweden	1	0	committed	Sept. 1994	yes
Switzerland	0	1	committed	Jan. 1995	yes
Thailand	1	-	lacking	unknown	-
Turkey	1	-	lacking	unknown	-
Turkmenistan	1	-	committed	unknown	-
United Kingdom	0	2	committed	Oct. 1994	yes
United States	7	12	committed	Aug.- Nov. 1994	yes
Western Samoa	0	1	committed	now	-
Zambia	0	1	lacking	unknown	-
TOTAL (Committed)	58 (38)	93 (76)	29 Countries		24

August 18, 1994

See Annex II for additional details

PRELIMINARY GSETT-3 ALPHA NETWORK
AS OF 19 AUGUST 1994

ANNEX II

Status Report from GSETT-3 Working Group on Planning

GSETT-3 Documentation

The drafting of GSETT-3 Documentation has been prepared as draft CRP/243 and currently comprises five volumes, as detailed in paragraph 13 of this progress report. Agreement was reached on all essential issues in this draft version of CRP/243 during the discussions at the 39th session, and the GSETT-3 Working Groups through their convenors were given the authority to revise this draft in the light of comments made and agreement reached in the GSE.

The draft version of CRP/243 is open to comments and suggestions by GSE delegates until 1 September 1994. Such comments should be sent to the appropriate working group convenors. The working groups will complete their review and provide material to the GSETT-3 Documentation Editor by 15 September 1994. The revised CRP/243 will then be distributed to the GSE delegates by the GSETT-3 Documentation Editor prior to the start of the full-scale testing on 1 January 1995.

Volume 3 of the GSETT-3 Documentation will contain so-called Countrybooks, with detailed technical descriptions of the GSETT-3 facilities (seismic stations, communication arrangements, etc.) in participating countries. The designated technical point of contact in each country has received from the GSETT-3 Documentation Editor detailed instructions on how to provide the material needed, together with a Countrybook template. Those who have not already done so, are asked to provide the information requested as soon as possible. Countries that have not yet designated a technical point of contact should do so as soon as possible, and they will then receive the appropriate documentation.

GSETT-3 Participation

Alpha stations

The GSE has now defined an Alpha network of 58 stations in 34 countries. Currently there are commitments by 17 host countries for 38 of these stations. For another 8 stations (in China, Denmark, Egypt, Germany, Iran and Mexico), the GSE (or the Working Group on Planning) has received information that there are concrete technical plans to contribute to GSETT-3, but that the formal commitment is pending.

There are eleven countries (Bolivia, Botswana, Indonesia, Ivory Coast, Kazakhstan, Kenya, Republic of Korea, Papua New Guinea, Paraguay, Thailand and Turkey) with planned Alpha network stations on their territory that have not yet responded concretely to the various requests for cooperation and commitment. It is currently the highest priority task of the Working Group on Planning to assist the GSE Chair in approaching these countries one more time. In addition, the GSE has envisaged two stations (in northern South America and in the northern part of Africa, respectively) at locations that are yet to be determined. Work is under way to identify countries that could host these two stations.

Beta stations

To date, the GSE has received information about 93 planned Beta stations, out of which 76 in 22 countries are committed for participation in GSETT-3. The vast majority of these stations are in countries participating in the GSE sessions.

The GSE chairman has approached the FDSN (Federation of Digital Seismograph Networks) and asked them to identify, in cooperation with its member networks, stations that might be utilized for GSETT-3. So far, the FDSN member networks IRIS and GEOFON have provided positive responses to this request.

Through this process, many countries have been identified that have stations on their territory that would be of potential interest as Beta stations in GSETT-3. For such Beta network candidate stations, the GSE chairman is seeking formal commitment for participation in GSETT-3 in direct contact with the authorities of the countries concerned. For many such stations, data are already openly available, and the only issue is to obtain a consent to use the data in question for the purposes of GSETT-3. To obtain such commitment or consent, the GSE chairman has so far written to 21 countries. Countries that have previously presented plans for participation with Beta stations have so far not been asked to commit additional stations.

ANNEX III

Status Report from GSETT-3 Working Group on Operations

Drafting of the GSETT-3 documentation on operations has proceeded in line with GSE/WGP,WGO, WGE/1, a large amount of documentation material had been gathered, compiled and distributed to GSE delegates.

Draft manuals for the GSETT-3 Seismic Station Operations, National Data Center Operations and International Data Center Operations have been distributed. The Operations Working Group has also been responsible for the compilation of draft annexes on the Formats and Protocols for Data Exchange (Annex 3), the GSE Database Structure and Attributes (Annex 4) and the GSETT-3 System Security Plan (Annex 5). Those sections of this documentation that are most important for successful, initial full scale operations in January 1995 have been reviewed both in open Operations Working Group meetings and GSE sessions and suggestions for additions, deletions and modifications of the documentation have been collected. These will be incorporated in revised versions of the documentation which will be distributed as quickly as possible.

GSETT-3 Operations: Status and Plans

Version 1 of GSETT-3 IDC completed successful operations on 30 June 1994. As is shown in the table below 12 Alpha stations were sending continuous data to the IDC as of August 1. These are ARCESS, NORESS and Spitzbergen, (Norway); FINESS (Finland); GERESS(Germany); Pinedale(US); Mould Bay and Waterton Lakes (Canada); Alice Springs, Woolibar and Armidale (Australia) and Mawson (Antarctica). It is expected that there could be about 23 Alpha stations contributing by the end of August. The slow rate at which new stations are being added is a concern, in that a significant amount of work is involved to establish reliable communications between the station and the IDC, and to train both the automated software and the analysts to interpret the data correctly.

	1 Feb 1994	**1 Aug 1994**	**Planned 1995**
Alpha Stations	6	12	57
w/continuous data to IDC	0	12	57
Beta Stations	13	21	>100
Coverage	European	Sparse global	Global
Countries submitting			
Gamma data	1	5	?
Volume data/day to IDC	0.2 Gbytes	1.5 Gbytes	~10Gbytes
Data Days	78	122	daily
Events in REB	19/day	22/day	100-300/day
IDC Staff	27	30	45

Key systems implemented early in version 2a include the regular submission of continuous Alpha data using the new GSE Alpha protocol and retrieval and provision of data using the new GSE message and upgrade AutoDRM-type (automatic Data Request Manager) software. Installation of a new operating system at the IDC (Solaris 2.3) necessitated major changes to the IDC operational software. The most important software to be implemented within the IDC during the next several months includes upgraded signal processing, automatic association, magnitude, long period processing and data access software.

International staffing of the IDC is another important objective of the Working Group on Operations. During the session applications for positions at the IDC were reviewed and qualified applicants were selected. Offers will be extended to the successful applicants.

ANNEX IV

Status report from GSETT-3 working group on evaluation

At the 37th session of the GSE, the working group (WGE) tabled a draft of the Evaluation volume of the GSETT-3 Documentation (GSE/WGE/5).

This draft was reviewed at the informal workshop held in Alexandria, USA, last April, and resulted in a number of changes to WGE/5.

Subsequently, chapter 4 of WGE/5 (on NDCs) has been rewritten. A revised version of WGE/5, including the results of the discussions in Alexandria and the new chapter 4, was included in the documentation set mailed to all GSE members last July.

During the Alexandria workshop, WGE members visited the IDC in order to:

(i) determine to what extent the statistics required for evaluation are already being, or could readily by, produced by the IDC.

(ii) develop a draft procedure for a quality assurance evaluation of the IDC.

It was established that the IDC can indeed provide much of the information required for the evaluation of GSETT-3. An assessment of the current and possible capability of the IDC to do this was prepared by IDC staff and was discussed by the WGE during this session.

Many of the tasks outlined in the Evaluation volume can however only be carried out by the NDCs or as national investigations.

Most delegations in response to a questionnaire identified particular aspects of evaluation to which they intend to contribute (see the attached table).

NDCs may participate in the evaluation either through an interactive computer program (now being produced), by reporting evaluation information to the IDC in a format that is described in the "formats" annex of the GSETT-3 documentation set, or if necessary by other means.

GSE delegates are urged to review these formats and comment upon their suitability and completeness.

The draft IDC "Quality Assurance Evaluation" will be added as an annex to the GSETT-3 Documentation set.

Several national investigations provided preliminary evaluation of detection and location capabilities of the present limited GSETT-3 network. These studies are being used to help define a standardised procedure for future evaluations of this type. The WGO, in its GSE/WGO/Informal 2 provided comments on this preliminary analysis.

Schedule for future work

- The IDC quality assurance evaluation is tentatively scheduled for October 1994 and is expected to last 4-5 weeks. Selected items should however, if possible, be evaluated earlier.

- The WGE will meet in early January, at the EIDC, in order to assess and prepare a report on the overall state of readiness for GSETT-3 on 1 January 1995. This report will be presented at the next GSE meeting (February 1995).

- As various aspects of GSETT-3 (e.g. sufficient number of stations, formats, etc.) are finalized, it will become possible to evaluate these aspects in a preliminary way - e.g. detection/location capability in certain parts of the world (national investigations presented at this session; stations noise characteristics, etc.).

- Develop an "action plan" to coordinate the work of those contributing to the different aspects of GSETT-3 evaluation.

Country	Willing to Help	Areas of Involvement	Weekly Evaluation Reports
Argentina	Yes	SEIS	Yes
Australia	Yes	NDC, IDC, COM	Yes
Austria			
Belgium	Yes	GI, S&N, SEIS	Yes
Bulgaria	Yes	SEIS	Yes *
Canada	Yes	GI, IDC, COM, S&N, SEIS	Yes
China	Yes	S&N, SEIS	? *
Czech Republic	? *	NDC, SEIS	Yes *
Denmark	Yes	SEIS	Yes
Egypt			
Finland	Yes	GI, NDC, S&N, SEIS	Yes
France	Yes	GI, SEIS	Yes
Germany	Yes	IDC	Yes *
Hungary	? *	SEIS	No *
India			
Iran			
Israel			
Italy	Yes	SEIS	Yes
Japan	Yes	SEIS	Yes
Korea, Republic of	Yes	S&N	No
Netherlands	Yes	GI, S&N, SEIS	Yes
New Zealand	Yes	NDC, SEIS	Yes
Norway	Yes	IDC, SEIS	Yes
Pakistan	Yes	NDC	Yes
Peru	Yes	SEIS	No *
Poland	No	SEIS	No *
Russian Federation	Yes	NDC, IDC, SEIS	Yes
South Africa	Yes	NDC, S&N	Yes *
Spain	Yes	GI, NDC, SEIS	Yes
Sweden	Yes	GI, IDC, S&N, SEIS	Yes
Switzerland	Yes	NDC, IDC, SEIS	Yes
United Kingdom	Yes	NDC	Yes
United States	Yes	ALL	Yes

GSE Participation in GSETT-3 Evaluation

Key: * = under discussion @ = expected later GI = General Issues
SEIS = Seismological S&N = Stations and Networks COM = communications

ANNEX V

Draft work programme for the next (40th) session

1. Review of initial results from the full-scale GSETT-3 testing
   - IDC reports
   - National reports by participants
2. Preliminary evaluation of the GSETT-3 system and its initial results
3. Discussion of modifications to GSETT-3 procedures needed in the light of these experiences
4. Presentation and review of national investigations into relevant matters
5. Discussion of future plans
6. Answer possible questions relating to GSETT-3 from the NTB Ad Hoc Committee or its Working Group on Verification
7. Submission of a progress report to the CD
8. Other matters